Final HPV Challenge Program Submission for

Antimony Dipentyldithiocarbamate

CAS Registry Number 15890-25-2

February 2008

Summary

The R. T. Vanderbilt Company, Inc. is pleased to submit this final submission for antimony dipentyldithiocarbamate under the Environmental Protection Agency's High Production Volume (HPV) Challenge Program.

Antimony dipentyldithiocarbamate is used as a petroleum extreme pressure and antiwear agent. The requirements of the EPA High Production Volume Chemical Testing Program have been met.

BACKGROUND

Background Information: Manufacturing and Commercial Applications

Manufacturing

This material has been manufactured for over 30 years. It is manufactured by batch rather than continuous process.

Commercial Applications

Antimony dipentyldithiocarbamate is used in industrial applications as an extreme pressure and antiwear agent. This material eliminates the need for supplemental antioxidants.

Shipping/Distribution

Antimony dipentyldithiocarbamate is shipped extensively throughout the world from manufacturing plants located in North America and Western Europe.

Worker/Consumer Exposure

To the best of our knowledge, all of this material is used by the grease and lubricant industry as performance enhancing additive to enhance load-carrying ability of lubricants and greases and to protect lubricant and greases against oxidative degradation. The lubricant and grease industry has a long safety record and only sophisticated producers handle this material. Most large industrial producers have mechanized materials handling systems, so employee exposure is minimal. The greatest potential for skin exposure is at the packing station at the manufacturing site and, to a lesser extent, during weighing activities at the customer site.

Consumer exposure is minimal. Small amounts (less than 5 mass %) are used lubricant and greases. Consumers are typically industrial or commercial end-users and not the general public. The most likely route of end-user exposure is physical contact to finish lubricants and greases.

Background Information: HPV Endpoints

Physical chemical properties

The physical chemical properties of antimony dipentyldithiocarbamate have not been determined. EPIWIN modeling was used to predict boiling point, vapor pressure, and melting point of this material. The water solubility of antimony dipentyldithiocarbamate is < .0454 - mg/l at 20 °C; determination of the partition coefficient is not applicable. An estimated partition coefficient

value is provided. Table 1 presents the physical chemical data for this material.

No additional testing is proposed.

Environmental Fate

This material contains no hydrolysable functional groups (see Figure 1) and as such hydrolysis data are not applicable. The photodegradation half-life was estimated using EPIWIN; the half-life is predicted to be 27 minutes The test material is biodegradable but does not meet the criteria for readily biodegradable (20% degradation after 28 days under the conditions of OECD test guideline 301B).Fugacity modeling indicates this material would be found primarily in sediment and soil, which is consistent with its low water solubility. Table 1 presents the environmental fate data for this material.

No additional environmental fate testing is proposed. These endpoints are complete.

Environmental Effects

The acute aquatic toxicity of this material is not known. Due to the low water solubility of this material, acute aquatic toxicity is not expected to be relevant.

A chronic toxicity to daphnia (OECD 211) was conducted. Due to the low water solubility of the test substance, solutions were made up in acetonitrile. A daily water change regimen was employed rather than continuous flow through due to instability of the test substance in the light. Ten replicates of a single daphnid per group were exposed to the test substance at 0 (solvent control), 0.002, 0.0063, 0.02, 0.063 or 0.2 mg/L for 21 days. the numbers of live and dead adult Daphnia and live and dead young were determined daily.

Results are presented as nominal concentrations. The 14 and 21 d EC50 values for immobilization were 0.058 and 0.054 mg/l, respectively. The 21 d EC50 for reproduction was 0.084 mg/l. The 21 d LOEC was 0.063 mg/l based on the observation of significant mortalities in the adult generation. In terms of young produced per adult by day 21, no significant differences were observed. The 21 d NOEC was 0.02 mg/l based on no significant mortalities (immobilization) observed in the parental generation and no significant differences between the solvent control and 0.02 mg/l test group in terms of number of young produced per adult by day 21.

No additional environmental effect testing is proposed. These endpoints are complete.

Mammalian Toxicity

Table 1 presents the mammalian toxicity data for this material.

Acute Toxicity: The acute oral LD_{50} for antimony dipentyldithiocarbamate is 16,400 mg/kg. The acute dermal LD_{50} is 16,000 mg/kg.

Repeated Dose/Reproductive/Developmental Effects: A repeat dose toxicity study was conducted under OECD test guideline 422. Groups of male and female rats were exposed to the test material at 50, 250 or 1000 mg/kg bw/d by gavage, for up to 54 days. Clinical signs, behavioral assessments, body weight development, food and water consumption were monitored during the study. Hematology and blood chemistry were evaluated prior to mating on 5 animals per sex from each dose group. Pairing of animals within each dose group was undertaken on a one male:one female basis on day 15 of the study. During the lactation phase, clinical observations were performed on all surviving offspring, together with litter size and offspring weights and assessment of developmental landmarks. Extensive functional observational observations were performed on 5 selected males and females from each dose group. Males were terminated on day 42, followed by termination of all surviving females and offspring on day 5 postpartum. All animals were subject to a gross necropsy examination and histopathological evaluation of selected tissues was performed. One male treated with 250 mg/kg bw/d was found dead on day 33, however this was not considered related to treatment. There were no clinical signs of toxicity, no effects observed in the functional observational battery, no effects on body weight change or food or water consumption, and no effects on hematology or blood chemistry. There were no treatment related macroscopic abnormalities for parental animals of either sex, no effects on organ weights and no histopathological findings. The NOEL for systemic toxicity was considered to be 1000 mg/kg bw/d. There were no effects on mating performance or fertility. There were no inter group differences for litter size, sex ratio or viability. There were no effects on offspring development. There were no clinically observable signs of toxicity in offspring from treated animals. No treatment related effects on reproduction were evident. The NOEL for reproductive toxicity was considered to be 1000 mg/kg bw/d. There were no clinically observable signs of test material toxicity detected in offspring from treated animals. There were no treatment related abnormalities detected for interim death or terminal sacrifice offspring. The NOEL for developmental effects in offspring from treated animals was 1000 mg/kg bw/d, the highest dose tested.

Genotoxicity: A *Salmonella*/mammalian-microsome plate incorporation mutagenicity assay and an *in vivo* mouse micronucleus assay have been conducted with antimony dipentyldithiocarbamate. The results of the bacterial

mutagenicity test were negative; the mouse micronucleus showed weak positive activity.

No additional mammalian toxicity testing is proposed. These endpoints are complete.

Table 1. Matrix of Available and Adequate Data: CAS No. 15890-25-2

Test	Result (1)
Chemical/physical Properties	
Melting Point	345 C (estimated)
Vapor Pressure	2E-19 mm Hg (estimated)
Boiling Point	783 C (estimated)
Partition Coefficient	12.69 (estimated)
Water Solubility	< .0454 - mg/l at 20 °C
Environmental Fate	
Hydrolysis	No hydrolysable functional groups
Photodegradation	$t_{1/2}$ = 27 minutes
Biodegradation	biodegradable
Environmental Transport	Air 0.0652% Water 7.24% Soil 28.5% Sediment 64.2%
Aquatic Toxicity	
Acute Fish	(2)
Acute Daphnid	(2)
Algae	(2)
Chronic daphnia	21 d NOEC= .02 mg/l 21 d LOEC= .063 mg/l 21 d EC50= .084 mg/l
Mammalian Toxicity	
Acute Oral	16400 mg/kg (rat)
Acute Dermal	16000 mg/kg (rabbit)
Repeated Dose	NOEL = 1000 mg/kg bw/d (rat)
Genotoxicity (*in vitro* -bacteria)	negative
Genotoxicity (*in vivo*)	weak positive
Reproductive/Developmental	NOEL = 1000 mg/kg bw/d (rat)

(1) Details and references are available in the robust summaries.
(2) Due to the low water solubility of this material, acute aquatic toxicity is not expected to be relevant

Figure 1 Antimony dipentyldithiocarbamate structure